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ABSTRACT

Written to fulfill the requirements for a University of Minnesota College of Education off-campus Indian education course for public school teachers, this Native American curriculum unit for middle and high school reflects the calendar achievements of the Maya Indians. The calendar is discussed in terms of its base number 20 (vigesimal system), notation, and historical connotations. A Maya calendar and Julian calendar are illustrated with long count date, Julian date, and year-bearer. A 13-item bibliography is included. (MJB)

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THE MAYA CALENDAR: A NATIVE AMERICAN CURRICULUM UNIT FOR MIDDLE AND HIGH SCHOOL NATAM VIII

by

Edgar A. Torguson

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in coordination with
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Training of Teacher Trainers Program
College of Education
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This series of Native American Curriculum Units was authored by Minnesota public school teachers while they were enrolled in a University of Minnesota College of Education off-campus Indian education course. The course was taught in the suburbs largely through the initiation of the staff of the Indian Upward Bound Program, an Office of Education funded Minneapolis junior high community school program staffed by Indians and under Indian board control.

The production and distribution of these curriculum units to teachers across the State of Minnesota was made possible by the cooperation and contributions of several agencies.

The Minnesota Federation of Teachers is a teacher union movement affiliated with the AFL-CIO which seeks to promote collective bargaining relationships with school boards and other educational employers. Its activities at the national, state and local levels are directed to all the concerns of teachers about developing a better educational climate for children.

The Training of Teacher Trainers Program, College of Education, University of Minnesota, attempts to help Minnesota colleges and the Minneapolis and St. Paul school systems do a better job of training teachers for inner-city jobs.

The Training Center for Community Programs and the Office of Community Programs are operating divisions of the Center for Urban and Regional Affairs (CURA), University of Minnesota. CURA was established by the Regents to help make the University more responsive to the needs of the larger community, and to increase the constructive interaction between faculty and students, on the one hand, and those dealing directly with major public problems, on the other hand.

These curriculum units are an outgrowth of the participation of the University of Minnesota in the National Study of American Indian Education, USOE Number OEC-0 - 8 - 08 - 147 - 2805.

A Note on the First NATAM Curriculum Series

During the Spring of 1970, a special University of Minnesota course in Indian education was offered through the College of Education and the General Extension Division to public school teachers in the school system of Columbia Heights, a Minneapolis suburb. This course--which was taught in Columbia Heights--was arranged and specially designed as a result of a request from Columbia Heights school officials and teachers to Mr. Gene Eckstein, Director of Indian Upward Bound. (Indian Upward Bound is a special Indian education program funded by the U.S. Office of Education, the University of Minnesota, and the Minneapolis Public Schools. It operates at two inner-city Minneapolis junior high schools, and functions under the control of an all-Indian board of directors.) In addition to the usual on-campus course requirements, such as reading, enrollees were given special lectures by invited Indians in addition to the person responsible for accreditation, Dr. Arthur Harkins. Lecturers were compensated for their contributions by a special fee paid by the course enrollees. A complete listing of the lecture sessions follows:

April 1, 1970 — Mr. Charles Buckanaga (Chippewa) "Indian Americans and United States History" Mr. Buckanaga presented a brief resume of the relationship of the American Indian and the in-coming European Cultures. He also discussed a three-dimensional view of historical data, emphasizing the development of gradual feelings toward and the eventual end result of the native Americans.

April 8, 1970 — Mr. Roger Buffalohead (Ponca) "Urban Indian" Mr. Buffalohead discussed the conflicts and problems confronting the Indian in the migration to the Urban setting.

April 15, 1970 — Lecture on Urban Indians
Dr. Arthur Harkins - University of Minnesota

April 15, 1970	Gene Eckstein (Chippewa) "Cultural Conflict and Change." Mr. Eckstein discussed the changing cultures of the Indian American and the problems encountered.
April 22, 1970	G. William Craig (Mohawk) "Treaties and Reservations." Treaties by the United States and American Indian Nations. The out growth of reservations and their influences on the American Indian.
April 29, 1970	Lecture H Ed. III Dr. Arthur Harkins
May 6, 1970	Gene Eckstein (Chippewa) The psychological and sociological challenges of the Indian American citizen in the transition from the Indian reservation to an urban area.
May 13, 1970	Lecture H Ed. III Dr. Arthur Harkins
May 20, 1970	Mr. Will Antell (Chippewa) "Indian Educational Conflicts" Director of Indian Education in Minnesota, Mr. Antell presented the challenges of the teacher in Indian Education, together with their relationship to the Indian student, Indian family and Indian community.
May 29, 1970	Lecture H Ed. III Dr. Arthur Harkins Comments from the class - final examination.

As a course requirement, each teacher taking the course for credit authored a curriculum unit for the grade level or subject area which he or she was actively teaching. The best of these units - a total of nineteen - were selected, and the over-all quality was judged to be good enough to warrant wider distribution. It was felt that the units were a good example of what professional teachers can do--after minimal preparation, that the units filled an immediate need for the enrolled teachers for curriculum material about Indian Americans, and that they served as an opportunity to test a staff development model. The units were endorsed by a special motion of the Indian Upward Bound Board of Directors.

From Indian Upward Bound Board meeting--Thursday, January 7, 1971.

Certain people are asking that the curriculum guide of the NATAM series by taken from school teachings. There was discussion on this and it was suggested instead of criticizing the writing make suggestions on how to better them. Gert Buckanaga made a motion that we support the experimental curriculum guides. Seconded by Winifred Jourdain. Motion carried.

To accomplish distribution, the units were typed on stencils, mimeographed, assembled and covered. Costs were shared by the University's Training Center for Community Programs and the Training of Teacher Trainers Program of the College of Education. The units were then distributed throughout the state by shop stewards of the Minnesota Federation of Teachers, an AFT affiliate. The entirety of these distribution costs were borne by MFT.

A new NATAM series is currently being prepared. It will focus upon contemporary reservation and migrated Native Americans.

The Coordinators
May, 1971

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THE MAYA CALENDAR

The Number System

The system of numerical operations used currently by most people in the United States is the decimal system. It is based on ten digits, zero through nine inclusive. Ten is a natural base because of the ten digits on one's two hands.

The decimal system depends upon position and place value horizontally to determine the number. For example, the number 5,493 consists of:

three ones for a value of	3
nine tens for a value of	90
four hundreds for a value of	400
five thousands for a value of	5000
Total value	5493

The digit 3 is in the ones' position, the digit 9 is in the tens' position, the digit 4 is in the hundreds' position, and the digit 5 is in the thousands' position.

10^3	10^2	10^1	10^0
5	4	9	3

A number system can be formulated on any base number. The Maya Indians developed a number system that is vigesimal. This system, based on twenty, probably was developed by natives who went barefoot and were constantly exposed to twenty digits on hands and feet. The vigesimal system used by the Maya Indians had three digits: dot, bar, and zero.[1]

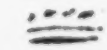
The vigesimal system depends upon position and place value vertically to determine the number.[2]

$20^4 = 16000$ (Cabal)
$20^3 = 8000$ (Pic)
$20^2 = 400$ (Bak)
$20^1 = 20$ (Kal)
$20^0 = 1$ (Hun)

The lower position is the unit or ones' value. When nineteen ones have been placed in the lower position and when the addition of one more is required, a mark is placed in the twenties' position, the nineteen marks are removed and a zero is placed in the ones' position designating the completion within that position. When nineteen marks in the twenties' position have been made and one more twenty is added, a mark is placed in the four hundreds' position, the nineteen marks in the twenties' position are removed, and a zero placed in the twenties' position shows completion within that position. The same procedure follows for larger numbers.

A dot (·) represents one, a bar(-) represents five, and zero ( ) represents completion within a position.[3] Combinations of bars and dots can represent a number up to and including nineteen in any position.

= 13 times 400 or 5200

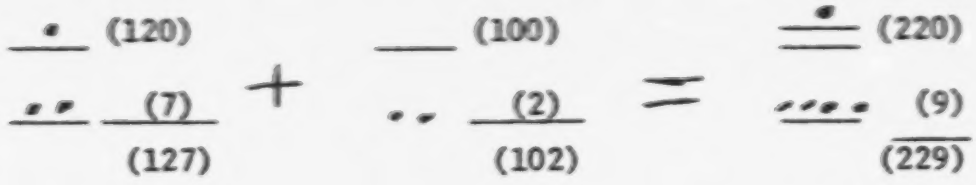
 = 14 times 20 or 280

= 13 times 1 or 13

Total 5493

The number zero was invented by the Mayas in the New World independently and previous to the invention of zero by the Hindus. Mayas invented the zero about the time of the birth of Christ; the Hindus didn't use zero until the years between the 6th and 9th centuries, A.D.[4]

The vertical position of the vigesimal notation permits simple addition.



Roman numerals used by the Old World are more complicated to use and certainly cannot be generally added.

The Mayas had developed astronomy to a high degree in the first century A.D. indicating that their number system was also highly developed.[5]

The Calendar

Since the Mayas used a vigesimal system, it is logical to conclude that their year should consist of 400 days. The Mayas probably used the vigesimal system until it became too confusing and had to be abandoned.

The Maya calendar was developed to a high degree of accuracy through astronomical observations and continuous recordings and mathematical calculations covering many hundreds of years.[6]

The Maya calendar had 20 day names similar to our Monday, Tuesday, etc. The 20 day names show the influence of the vigesimal system. The day names were: Imix, Ik, Akbal, Kan, Chiuhan, Cimi, Manik, Lamat, Muluc, Oi, Chuen, Eb, Ben, Ix, Meu, Cib, Caban, Eznab, Cauac, and Ahau.[7] These day names had thirteen day numbers in series like our weeks and ran on year after year. The year had 28 of these thirteen-day weeks plus one day.[8] The day with which a new year began was called its year-bearer. Only four of the twenty days work out to be year-bearers. They are Kan, Muluc, Ix, and Cauac.[9]

The Mayas were very superstitious. They believed the kind of year to follow was based on the god of the day name. Kan is the maize god; Muluc, the rain god; Ix and Cauac were malevolent and disastrous.[10]

The calendar had eighteen months of 20 days each. The Maya word for man was uinak (20 digits) while the word for month (20 days) was uinal.[11] Eighteen months of 20 days each would make the year consist of 360 days. To compensate for this, five supplementary days were added at the end. The 18 month names were: Pop, Uo, Zip, Zota, Tzec, Xul, Yaxkin, Mol, Chen, Yax, Zac, Ceh, Mac, Kankin, Muan, Pax, Kayab, Comhre, plus the five-day Uayeb.[12]

The structure of twenty day names and thirteen day numbers mathematically yields each day name only four possible month days to fall upon.[13]

Every Maya date was expressed by two numbers and two names. For example, in 4 Ahau 8 Cumhu, and 4 Ahau could correspond to Sunday and the 8 Cumhu to July 15.[14]

Our calendar is designed so that a day name and day number could be the same within a few-month period. If the day name, day number and month name of the Maya calendar are given, 18980 distinct, different combinations are used and any one combination will not repeat for 18980 days. This 52-year period is referred to as a Calendar Round.[15] Thus 4 Ahau will not fall on 8 Cumhu for 52 years.

The Mayas did not recognize the 365 day year but rather a "tun" which was 360 days plus a five-day religious and ceremonial celebration.[16]

The unit "tun" was not very large, so two larger units were devised based on the vigesimal system. The next larger unit was the "katun" (twenty tuns), and then the cycle or "baktun" (twenty katuns).[17]

The priests of the Mayas had many functions. One of these was the recording of a katun. Four large receptacles were used. Into the first jar a pebble a day was placed recording the kins. When twenty pebbles were in the first jar, a larger or a colored stone was placed in the second jar recording the uinals. When eighteen pebbles were placed in the second jar, these were removed and a still larger stone or a different colored stone was placed in the third jar recording tuns. When there were twenty stones in the third jar, one large stone was placed in the fourth jar recording one katun -- twenty tuns or 7200 days.

The priests were then to take each stone out one by one in order, giving the stone a day number and day name. To make sure that the priests did not lose a stone they were disrobed while counting the 7200 days.[18]

A katun would always end on day Ahau. If a katun ended on 11 Ahau, it was called katun 11. For each successive katun, the Ahau number dropped by two. Thus the katuns would be named in this sequence: 11 Ahau, 9 Ahau, 7 Ahau, t Ahau, 3 Ahau, 1 Ahau, 12 Ahau, 10 Ahau, 8 Ahau, 6 Ahau, 4 Ahau, 2 Ahau, 13 Ahau, and start over again with 11 Ahau.[19] Each katun covers 20 tuns; therefore, thirteen katuns cover about 260 years for the katun cycle. Katun 11 Ahau or simply Katun 11 would recur every 13 katuns (about 260 years; 256 years is more accurate because one tun is 360 days).[20]

Maya priests used the katun and katun cycle for prophecy in several ways. Mayas believed that the world would come to an end some day, but that destruction would come at the end of a katun.[21] Priests would also look up a past katun to predict what a future katun would be like. They thought history would repeat itself every 260 years. If katun 7 were starting, they would look up the records of katun 7 two hundred sixty years ago. Out of the 13 katuns for a cycle, only the prophecies for three were good.[22]

In Maya records, it is sometimes difficult to tell which 260 year period was indicated as only the day number and day name were written.[23]

The Mayas were not without another unit for their unique system of fixing time. The Long Count was used in the Maya era to fix time from the beginning. A date which was not fixed in the Long Count was simply a date in a calendar round which recurred every 52 years. The Long Count gives the cycles, katuns, tuns, uinals, and kins. For example, 9 - 10 - 6 - 5 - 9 means 9 cycles, 10 kautns, 6 tuns, 5 uinals, and 9 kins from the starting point of time.[24]

A date 8 Muluc 2 Zip will recur every 52 years, but if expressed 9 - 10 - 6 - 5 - 9, 8 Muluc 2 Zip, its position in time is fixed as its distance from the starting point of the Long Count.[25]

If the date 8 Muluc 2 Zip is expressed it will recur every 52 years. If it is written Katun 11, 8 Muluc 2 Zip, such a date cannot occur for 374,400 years.[26]

The starting point of the Long Count is not agreed upon. These dates were calculated as the starting point of the Maya calendar:

1. 3113 B.C.[27]
2. February 10, 3641 B.C.[28]
3. October 14, 3373 B.C.[29]
4. August 13, 3113 B.C.[30]
5. 3300 B.C.[31]

It is universally agreed, however, that the beginning of the Maya calendar is 4 Ahau 8 Cumhu. No event is recorded for this date. Therefore, all katuns and cycles of even periods in Long Count must end on day Ahau.[32]

The astronomical year is 365 days, 5 hours, 48 minutes, and 45.51 seconds.[33] Using this true year as compared to our present year, the amount of error is 46.8 days in 6000 years. The Maya calendar error was only slightly ever one day in 6000 years.[34]

This amazing accuracy was achieved by the use of "at least four systems of annotating time."[35] The 365 day year was one check. Twenty day names and thirteen day numbers yield a 260 day period which was used because of its "natural" number. The lunar calendar was used by the Mayas and by most of the primitive people. The fourth check was perhaps the most involved -- that of elaborate observations of Venus and Mercury. These systems were so accurate that they were used as a check on each other.[36]

It is amazing that the length of the Venus cycle could be accurately determined considering the geographic location of the Maya civilization. It is characteristically foggy and misty most of the morning, and cloudy during the rainy season. "There are only five inferior conjunctions of Venus in eight years, and so in the thirty years of his manhood (the Maya are not long-lived) a priest-astronomer might under ideal conditions observe about twenty heliacal risings. In reality, bad weather would reduce that number to about ten."[37]

These four systems were interrelated. The 584 days for one revolution of Venus and the 260 day cycle have a highest common factor of 4. 584 divided by 4 is 146. 146 times 260 is 379k0 days. This length of time is 65 Venus revolutions, 146 rounds of 260 days, 104 years of 365 days.[38]

These should have the same resting place but do not, so a correction was needed in the Venus cycle. A correction of subtracting four days at the end of the 61st Venus year for 35620 days, which is the same for 137 rounds of 260 day cycles. This disrupts the 365 day year as 35620 is not divisible by 365. This was ingeniously taken care of by making corrections of 24 days after 301 Venus revolutions. Actually, a correction of 24.08 days should have been made. This amounts to an error of slightly over one day in 6000 years.[39]

A MAYA CALENDAR AND JULIAN CALENDAR WITH LONG COUNT DATE, JULIAN DATE, AND YEAR-BEARER

The Long Count 12 - 12 - 0 - 0 - 0, 7 Ahau 13 Kayab, means 12 cycles, 12 katuns in Long Count. 7 Ahau, 13 Kayab is the close of the katun 7 and the start of katun 5, which is September 29, 1594. The end of katun 5 is 12 - 13 - 0 - 0 - 0, 5 Ahau 13 Ceh.

November 2, 1594 has the year-bearer 2 Ix which agrees with the calendar listed.[40]

JULIAN	MAYA		JULIAN	MAYA	
1593					
Nov. 2	1 Muluc	2 Pop	Dec. 1	4 Eznab	11 Uo
Nov. 3	2 Oc	3 Pop	Dec. 2	5 Cauac	12 Uo
Nov. 4	3 Chuen	4 Pop	Dec. 3	6 Ahau	13 Uo
Nov. 5	4 Eb	5 Pop	Dec. 4	7 Imix	14 Uo
Nov. 6	5 Ben	6 Pop	Dec. 5	8 Ik	15 Uo
Nov. 7	6 Ix	7 Pop	Dec. 6	9 Akbal	16 Uo
Nov. 8	7 Meu	8 Pop	Dec. 7	10 Kan	17 Uo
Nov. 9	8 Cib	9 Pop	Dec. 8	11 Chicchan	18 Uo
Nov.10	9 Caban	10 Pop	Dec. 9	12 Cimi	19 Uo
Nov.11	10 Eznab	11 Pop	Dec.10	13 Manik	o Zip
Nov.12	11 Cauac	12 Pop	Dec.11	1 Lamat	1 Zip
Nov.13	12 Ahau	13 Pop	Dec.12	2 Muluc	2 Zip
Nov.14	13 Imix	14 Pop	Dec.13	3 Oc	3 Zip
Nov.15	1 Ik	15 Pop	Dec.14	4 Chuen	4 Zip
Nov.16	2 Akbal	16 Pop	Dec.15	5 Eb	5 Zip
Nov.17	3 Kan	17 Pop	Dec.16	6 Ben	6 Zip
Nov.18	4 Chicchan	18 Pop	Dec.17	7 Ix	7 Zip
Nov.19	5 Cimi	19 Pop	Dec.18	8 Meu	8 Zip
Nov.20	6 Manik	0 Uo	Dec.19	9 Cib	9 Zip
Nov.21	7 Lamat	1 Uo	Dec.20	10 Caban	10 Zip
Nov.22	8 Muluc	2 Uo	Dec.21	11 Eznab	11 Zip
Nov.23	9 Oc	3 Uo	Dec.22	12 Cauac	12 Zip
Nov.24	10 Chuen	4 Uo	Dec.23	13 Ahau	13 Zip
Nov.25	11 Eb	5 Uo	Dec.24	1 Imix	14 Zip
Nov.26	12 Ben	6 Uo	Dec.25	2 Ik	15 Zip
Nov.27	13 Ix	7 Uo	Dec.26	3 Akbal	16 Zip
Nov.28	1 Meu	8 Uo	Dec.27	4 Kan	17 Zip
Nov.29	2 Cib	9 Uo	Dec.28	5 Chicchan	18 Zip
Nov.30	3 Caban	10 Uo	Dec.29	6 Cimi	19 Zip

JULIAN	MAYA		JULIAN	MAYA	
Dec. 30	7 Manik	0 Zota	Feb.14	1 Ben	6 Xul
Dec. 31	8 Lamat	1 Zota	Feb.15	2 Ix	7 Xul
			Feb.16	3 Meu	8 Xul
1594			Feb.17	4 Cib	9 Xul
Jan. 1	9 Muluc	2 Zota	Feb.18	5 Caban	10 Xul
Jan. 2	10 Oc	3 Zota	Feb.19	6 Eznab	11 Xul
Jan. 3	11 Chuen	4 Zota	Feb.20	7 Cauac	12 Xul
Jan. 4	12 Eb	5 Zota	Feb.21	8 Ahau	13 Xul
Jan. 5	13 Ben	6 Zota	Feb.22	9 Imix	14 Xul
Jan. 6	1 Ix	7 Zota	Feb.23	10 Ik	15 Xul
Jan. 7	2 Meu	8 Zota	Feb.24	11 Akbal	16 Xul
Jan. 8	3 Cib	9 Zota	Feb.25	12 Kan	17 Xul
Jan. 9	4 Caban	10 Zota	Feb.26	13 Chicchan	18 Xul
Jan.10	5 Eznab	11 Zota	Feb.27	1 Cimi	19 Xul
Jan.11	6 Cauac	12 Zota	Feb.28	2 Manik	0 Yaxkin
Jan.12	7 Ahau	13 Zota	Mar. 1	3 Lamat	1 Yaxkin
Jan.13	8 Imix	14 Zota	Mar. 2	4 Muluc	2 Yaxkin
Jan.14	9 Ik	15 Zota	Mar. 3	5 Oc	3 Yaxkin
Jan.15	10 Akbal	16 Zota	Mar. 4	6 Chuen	4 Yaxkin
Jan.16	11 Kan	17 Zota	Mar. 5	7 Eb	5 Yaxkin
Jan.17	12 Chicchan	18 Zota	Mar. 6	8 Ben	6 Yaxkin
Jan.18	13 Cimi	19 Zota	Mar. 7	9 Ix	7 Yaxkin
Jan.19	1 Manik	0 Tzec	Mar. 8	10 Meu	8 Yaxkin
Jan.20	2 Lamat	1 Tzec	Mar. 9	11 Cib	9 Yaxkin
Jan.21	3 Muluc	2 Tzec	Mar.10	12 Caban	10 Yaxkin
Jan.22	4 Oc	3 Tzec	Mar.11	13 Eznab	11 Yaxkin
Jan.23	5 Chuen	4 Tzec	Mar.12	1 Cauac	12 Yaxkin
Jan.24	6 Eb	5 Tzec	Mar.13	2 Ahau	13 Yaxkin
Jan.25	7 Ben	6 Tzec	Mar.14	3 Imix	14 Yaxkin
Jan.26	8 Ix	7 Tzec	Mar.15	4 Ik	15 Yaxkin
Jan.27	9 Meu	8 Tzec	Mar.16	5 Akbal	16 Yaxkin
Jan.28	10 Cib	9 Tzec	Mar.17	6 Kan	17 Yaxkin
Jan.29	11 Caban	10 Tzec	Mar.18	7 Chicchan	18 Yaxkin
Jan.30	12 Eznab	11 Tzec	Mar.19	8 Cimi	19 Yaxkin
Jan.31	13 Cauac	12 Tzec	Mar.20	9 Manik	0 Mol
Feb. 1	1 Ahau	13 Tzec	Mar.21	10 Lamat	1 Mol
Feb. 2	2 Imix	14 Tzec	Mar.22	11 Muluc	2 Mol
Feb. 3	3 Ik	15 Tzec	Mar.23	12 Oc	3 Mol
Feb. 4	4 Akbal	16 Tzec	Mar.24	13 Chuen	4 Mol
Feb. 5	5 Kan	17 Tzec	Mar.25	1 Eb	5 Mol
Feb. 6	6 Chicchan	18 Tzec	Mar.26	2 Ben	6 Mol
Feb. 7	7 Cimi	19 Tzec	Mar.27	3 Ix	7 Mol
Feb. 8	8 Manik	0 Xul	Mar.28	4 Meu	8 Mol
Feb. 9	9 Lamat	1 Xul	Mar.29	5 Cib	9 Mol
Feb.10	10 Muluc	2 Xul	Mar.30	6 Caban	10 Mol
Feb.11	11 Oc	3 Xul	Mar.31	7 Eznab	11 Mol
Feb.12	12 Chuen	4 Xul	Apr. 1	8 Cauac	12 Mol
Feb.13	13 Eb	5 Xul	Apr. 2	9 Ahau	13 Mol

JULIAN	MAYA		JULIAN	MAYA	
Apr. 3	10 Imix	14 Mol	May 20	5 Lamat	1 Zac
Apr. 4	11 Ik	15 Mol	May 21	6 Muluc	2 Zac
Apr. 5	12 Akbal	16 Mol	May 22	7 Oc	3 Zac
Apr. 6	13 Kan	17 Mol	May 23	8 Chuen	4 Zac
Apr. 7	1 Chicchan	18 Mol	May 24	9 Eb	5 Zac
Apr. 8	2 Cimi	19 Mol	May 25	10 Ben	6 Zac
Apr. 9	2 Manik	0 Chen	May 26	I1 Ix	7 Zac
Apr.10	4 Lamat	1 Chen	May 27	12 Meu	8 Zac
Apr.11	5 Muluc	2 Chen	May 28	13 Cib	9 Zac
Apr.12	6 Oc	3 Chen	May 29	1 Caban	10 Zac
Apr.13	7 Chuen	4 Chen	May 30	2 Eznab	11 Zac
Apr.14	8 Eb	5 Chen	May 31	3 Cauac	12 Zac
Apr.15	9 Ben	6 Chen	Jane 1	4 Ahau	13 Zac
Apr.16	10 Ix	7 Chen	June 2	5 Imix	14 Zac
Apr.17	11 Meu	8 Chen	June 3	6 Ik	15 Zac
Apr.18	12 Cib	9 Chen	June 4	7 Akbal	16 Zac
Apr.19	13 Caban	10 Chen	June 5	8 Kan	17 Zac
Apr.20	1 Eznab	11 Chen	June 6	9 Chicchan	18 Zac
Apr.21	2 Cauac	12 Chen	June 7	10 Cimi	19 Zac
Apr.22	3 Ahau	13 Chen	June 8	11 Manik	0 Ceh
Apr.23	4 Imix	14 Chen	June 9	12 Lamat	1 Ceh
Apr.24	5 Ik	15 Chen	June 10	13 Lumuc	2 Ceh
Apr.25	6 Akbal	16 Chen	June 11	1 Oc	3 Ceh
Apr.26	7 Kan	17 Chen	June 12	2 Chuen	4 Ceh
Apr.27	8 Chicchan	18 Chen	June 13	3 Eb	5 Ceh
Apr.28	9 Cimi	19 Chen	June 14	4 Ben	6 Ceh
Apr.29	10 Manik	o Yax	June 15	5 Ix	7 Ceh
Apr.30	11 Lamat	1 Yax	June 16	6 Meu	8 Ceh
May 1	12 Muluc	2 Yax	June 17	7 Cib	9 Ceh
May 2	13 Oc	3 Yax	June 18	8 Caban	10 Ceh
May 3	1 Chuen	4 Yax	June 19	9 Eznab	11 Ceh
May 4	2 Eb	5 Yax	June 20	10 Cauca	12 Ceh
May 5	3 Ben	6 Yax	June 21	11 Ahau	13 Ceh
May 6	4 Ix	7 Yax	June 22	12 Imix	14 Ceh
May 7	5 Meu	8 Yax	June 23	13 Ik	15 Ceh
May 8	6 Cib	9 Yax	June 24	1 Akbal	16 Ceh
May 9	7 Caban	10 Yax	June 25	2 Kan	17 Ceh
May 10	8 Eznab	11 Yax	June 26	3 Chicchan	18 Ceh
May 11	9 Cauac	12 Yax	June 27	4 Cimi	19 Ceh
May 12	10 Ahau	13 Yax	June 28	5 Manik	0 Mac
May 13	11 Imix	14 Yax	June 29	6 Lamat	1 Mac
May 14	12 Ik	15 Yax	June 30	7 Muluc	2 Mac
May 15	13 Akbal	16 Yax	July 1	8 Oc	3 Mac
May 16	1 Kan	17 Yax	July 2	9 Chuen	4 Mac
May 17	2 Chicchan	18 Yax	July 3	10 Eb	5 Mac
May 18	3 Cimi	19 Yax	July 4	11 Ben	6 Mac
May 19	4 Manik	0 Zac	July 5	12 Ix	7 Mac

JULIAN	MAYA		JULIAN	MAYA	
July 6	13 Meu	8 Mac	Aug. 21	7 Imix	14 Muan
July 7	1 Cib	9 Mac	Aug. 22	8 Ik	15 Muan
July 8	2 Caban	10 Mac	Aug. 23	9 Akbal	16 Muan
July 9	3 Eznab	11 Mac	Aug. 24	10 Kan	17 Muan
July 10	4 Cauac	12 Mac	Aug. 25	11 Chicchan	18 Muan
July 11	5 Ahau	13 Mac	Aug. 26	12 Cimi	19 Muan
July 12	6 Imix	14 Mac	Aug. 27	13 Manik	0 Pax
July 13	7 Ik	15 Mac	Aug. 28	1 Lamat	1 Pax
July 14	8 Akbal	16 Mac	Aug. 29	2 Muluc	2 Pax
July 15	9 Kan	17 Mac	Aug. 30	3 Oc	3 Pax
July 16	10 Chicchan	18 Mac	Aug. 31	4 Chuen	4 Pax
July 17	11 Cimi	19 Mac	Sept. 1	5 Eb	5 Pax
July 18	12 Manik	0 Kankin	Sept. 2	6 Ben	6 Pax
July 19	13 Lamat	1 Kankin	Sept. 3	7 Ix	7 Pax
July 20	1 Muluc	2 Kankin	Sept. 4	8 Meu	8 Pax
July 21	2 Oc	3 Kankin	Sept. 5	9 Cib	9 Pax
July 22	3 Chuen	4 Kankin	Sept. 6	10 Caban	10 Pax
July 23	4 Eb	5 Kankin	Sept. 7	11 Eznab	11 Pax
July 24	5 Ben	6 Kankin	Sept. 8	12 Cauac	12 Pax
July 25	6 Ix	7 Kankin	Sept. 9	13 Ahau	13 Pax
July 26	7 Meu	8 Kankin	Sept.10	1 Imix	14 Pax
July 27	8 Cib	9 Kankin	Sept.11	2 Ik	15 Pax
July 28	9 Caban	10 Kankin	Sept.12	3 Akbal	16 Pax
July 29	10 Eznab	11 Kankin	Sept.13	4 Kan	17 Pax
July 30	11 Cauac	12 Kankin	Sept.14	5 Chicchan	18 Pax
July 31	12 Ahau	13 Kankin	Sept.15	6 Cimi	19 Pax
Aug. 1	13 Imix	14 Kankin	Sept.16	7 Manik	0 Kayab
Aug. 2	1 Ik	15 Kankin	Sept.17	8 Lamat	1 Kayab
Aug. 3	2 Akbal	16 Kankin	Sept.18	9 Kuluc	2 Kayab
Aug. 4	3 Kan	17 Kankin	Sept.19	10 Oc	3 Kayab
Aug. 5	4 Chicchan	18 Kankin	Sept.20	11 Chuen	4 Kayab
Aug. 6	5 Cimi	19 Kankin	Sept.21	12 Eb	5 Kayab
Aug. 7	6 Manik	0 Muan	Sept.22	13 Ben	6 Kayab
Aug. 8	7 Lamat	1 Muan	Sept.23	1 Ix	7 Kayab
Aug. 9	8 Muluc	2 Muan	Sept.24	2 Meu	8 Kayab
Aug. 10	9 Oc	3 Muan	Sept.25	3 Cib	9 Kayab
Aug. 11	10 Chuen	4 Muan	Sept.26	4 Caban	10 Kayab
Aug. 12	11 Eb	5 Muan	Sept.27	5 Eznab	11 Kayab
Aug. 13	12 Ben	6 Muan	Sept.28	6 Cauac	12 Kayab
Aug. 14	13 Ix	7 Muan	Sept.29	7 Ahau	13 Kayab*
Aug. 15	1 Meu	8 Muan	Sept.30	8 Imix	14 Kayab
Aug. 16	2 Cib	9 Muan	Oct. 1	9 Ik	15 Kayab
Aug. 17	3 Caban	10 Muan	Oct. 2	10 Akbal	16 Kayab
Aug. 18	4 Eznab	11 Muan	Oct. 3	11 Kan	17 Kayab
Aug. 19	5 Cauac	12 Muan	Oct. 4	12 Chicchan	18 Kayab
Aug. 20	6 Ahau	13 Muan	Oct. 5	13 Cimi	19 Kayab

* 12 - 12 - 0 - 0 - 0

JULIAN	MAYA		JULIAN	MAYA	
Oct. 6	1 Manik	0 Cumhu	Oct. 20	2 Imix	14 Cumhu
Oct. 7	2 Lamat	1 Cumhu	Oct. 21	3 Ik	15 Cumhu
Oct. 8	3 Muluc	2 Cumhu	Oct. 22	4 Akbal	16 Cumhu
Oct. 9	4 Oc	3 Cumhu	Oct. 23	5 Kan	17 Cumhu
Oct. 10	5 Chuen	4 Cumhu	Oct. 24	6 Chicchan	18 Cumhu
Oct. 11	6 Eb	5 Cumhu	Oct. 25	7 Cimi	19 Cumhu
Oct. 12	7 Ben	6 Cumhu	Oct. 26	8 Manik	0 Uayeb
Oct. 13	8 Ix	7 Cumhu	Oct. 27	9 Lamat	1 Uayeb
Oct. 14	9 Meu	8 Cumhu	Oct. 28	10 Muluc	2 Uayeb
Oct. 15	10 Cib	9 Cumhu	Oct. 29	11 Oc	3 Uayeb
Oct. 16	11 Caban	10 Cumhu	Oct. 30	12 Chuen	4 Uayeb
Oct. 17	12 Eznab	11 Cumhu	Oct. 31	13 Eb	0 Pop
Oct. 18	13 Cauac	12 Cumhu	Nov. 1	1 Ben	1 Pop
Oct. 19	1 Ahau	13 Cumhu	Nov. 2	2 Ix	2 Pop **

** Year-bearer

FOOTNOTES

1. Elizabeth P. Benson, The Maya World (New York, 1967), p. 104.

2. Board of Regents of the Smithsonian Institute, Annual Report of Board of Regents of the Smithsonian Institution (Washington, D.C., 1935), p. 429.

3. Benson, The Maya World, p. 104.

4. James Norman, The Forgotten Empire (New York, 1965), pp. 86-87.

5. Benson, The Maya World, p. 107.

6. Eric S. Thompson, The Rise and Fall of Maya Civilization (Norman, Oklahoma, 1954), pp. 153-54.

7. Encyclopaedia Britannica, Vol. 4, p. 581.

8. Encyclopaedia Britannica, Vol. 4, p. 581.

9. Thompson, The Rise and Fall of Maya Civilization, p. 139.

10. Ibid.

11. Michael D. Coe, The Maya (New York, 1966), p. 58.

12. Encyclopaedia Britannica, Vol. 4, p. 581.

13. Ibid.

14. Ibid.

15. Benson, The Maya World, p. 100.

16. Encyclopaedia Britannica, Vol. 5, p. 660.

17. Ibid.

18. Maud Worcester Makemson, The Book of the Jaguar Priest (New York, 1951), pp. 161-62.

19. Thompson, The Rise and Fall of Maya Civilization, p. 101.

20. Encyclopaedia Britannica, Vol. 5, p. 661.

21. Thompson, The Rise and Fall of Maya Civilization, p. 190.

22. Ibid., p. 141.

23. Benson, The Maya World, p. 101.

24. Encyclopaedia Britannica, Vol. 5, pp. 660-61.

25. Ibid., p. 661.

26. Ibid.

27. Thompson, The Rise and Fall of Maya Civilization, p. 152.

28. Encyclopaedia Britannica, Vol. 5, p. 662.

29. Ibid.

30. Ibid.

31. Blom, The Conquest of Yucatan, p. 190.

32. Encyclopaedia Britannica, Vol. 5, p. 661.

33. Webster's Collegiate Dictionary, Fifth Edition, p. 1169.

34. Thompson, The Rise and Fall of Maya Civilization, p. 146.

35. Blom, The Conquest of Yucatan, p. 198.

36. Ibid., pp. 198-99.

37. Thompson, The Rise and Fall of Maya Civilization, p. 146.

38. Ibid., p. 145.

39. Ibid., p. 146.

40. Makemson, The Book of the Jaguar Priest, p. 213.

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